

The logo for Alert Systems Ltd. features a stylized, dark blue graphic above the company name. The graphic consists of a curved, swooping line that starts on the left, arches over the text, and ends on the right, with a smaller, downward-pointing arrow-like shape below it.

**Alert Systems Ltd.**

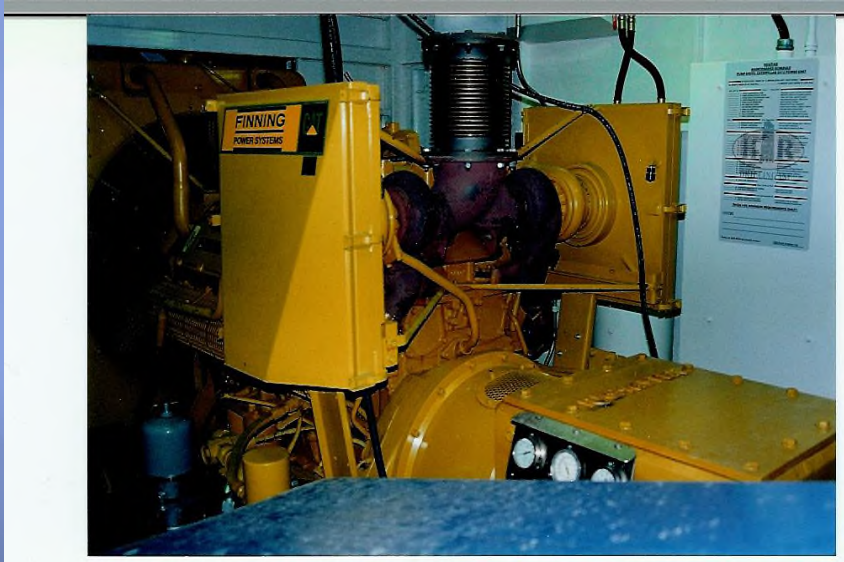
## **Solutions in:**

- ✓ **Preventive Maintenance Consulting**
- ✓ **Preventive Maintenance Training**
- ✓ **Asset Management Solutions**

# Key Understanding

- ▣ **Attitude:** Attitudes must reflect the fact that positive changes in procedures are possible, necessary and attainable.
- ▣ **Leadership:** Leadership by example from all levels of management.
- ▣ **Experience:** The collective experience found in the human resource base of your company is invaluable in setting goals for the future.
- ▣ **Response:** Response from all levels of management in an informed way, based on an understanding that is clear and reasonable.
- ▣ **Training:** Knowledge is power. Basic operational concepts need to be clearly understood in order to operate efficiently. Quality training is that key resource.

# Preventive Maintenance Consulting



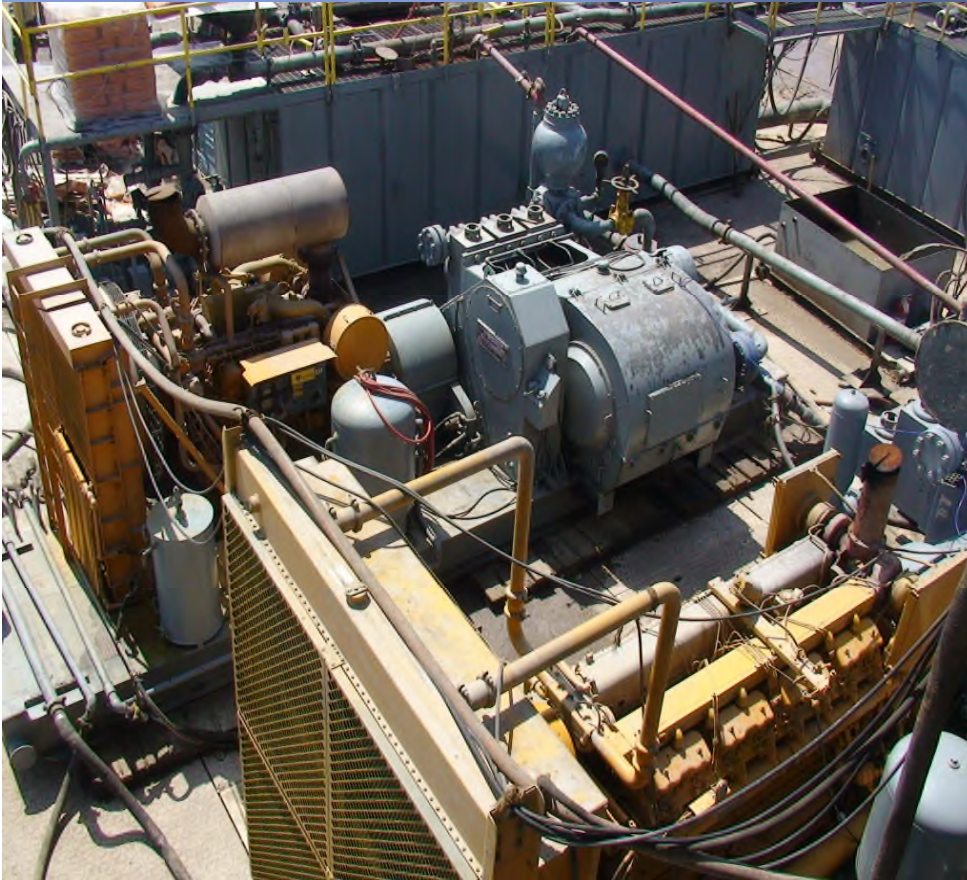
- Compile maintenance priorities strategy.
- Compile a PM program that gives specific maintenance requirements.

- ▣ Perform an equipment maintenance audit.
- ▣ Compile and design component arrangement enhancements.





# The Requirements are Charted,... Component Specific



## ROUTINE MAINTENANCE

### TOP DRIVE PRIME MOVER & HYDRAULIC SYSTEM

#### DAILY:

#### BEFORE START UP or AFTER 20 MINUTE SHUT DOWN

- |  |  |
|--|--|
| <ol style="list-style-type: none"> <li>1. CHECK CRANKCASE OIL LEVEL</li> <li>2. CHECK COOLANT SYSTEM LEVEL</li> <li>3. CHECK FOR COOLANT, OIL &amp; FUEL LEAKS</li> <li>4. PANEL GAUGE OPERATION</li> <li>5. INTAKE SYSTEM SECURITY</li> <li>6. CHECK ALL DRIVE BELTS</li> <li>7. FUEL FILTERS</li> <li>8. RADIATOR INSPECTION /CHARGE COOLER/OIL COOLER</li> <li>9. EMERGENCY SHUT DOWN SYSTEM</li> <li>10. CHECK PUMP DRIVE OIL LEVEL</li> <li>11. CHECK HYDRAULIC TANK OIL LEVEL</li> <li>12. CHECK HYDRAULIC FILTERS</li> <li>A. <a href="#">TOP DRIVE DAILY CHECKS</a></li> </ol> | <ul style="list-style-type: none"> <li>-Before start up or after 20 minute shut down</li> <li>-Maintain coolant quality - level - pressure</li> <li>-Visual inspection</li> <li>-Ensure normal operation</li> <li>-Visual check of clamps/piping/monitor</li> <li>-No loose or broken fan drive belts</li> <li>-Check lower bowl for water.</li> <li>-Check for leaks and component security</li> <li>-Would it work if you needed it?</li> <li>-Visual of sight glass</li> <li>-Visual of sight glass</li> <li>-Visual of filter monitors</li> <li>-<a href="#">Refer to DAILY MAINTENANCE</a></li> </ul> |
|--|--|

#### AFTER MORE THAN 10 HOURS SHUT DOWN @ AMBIENT TEMPERATURES

#### START UP & WARM UP

#### DO NOT USE STARTING FLUID!

- |  |  |
|--|--|
| <ol style="list-style-type: none"> <li>13. Warm weather start up</li> <li>14. Cold weather start up</li> </ol> | <ul style="list-style-type: none"> <li>- Idle @ "no load" for 10 minutes</li> <li>- Pre heat with coolant heater</li> <li>- Idle @ "no load" for 20 minutes</li> </ul> |
|--|--|

#### EVERY 250 OPERATING HOURS

- |  |  |
|--|--|
| <ol style="list-style-type: none"> <li>15. BATTERIES</li> <li>16. ENGINE CRANKCASE OIL               <ol style="list-style-type: none"> <li>A. Change crankcase oil &amp; oil filter(s)</li> <li>B. If "Spinner II" is in place &amp; functional</li> <li>C. Complete engine oil &amp; filter service</li> </ol> </li> <li>17. RADIATOR / CHARGE COOLER / OIL COOLER</li> <li>18. CHECK PUMP DRIVE MOUNTS / COUPLING/ DRIVELINE</li> <li>B. <a href="#">TOP DRIVE SYSTEM CHECKS</a></li> </ol> | <ul style="list-style-type: none"> <li>- Check electrolyte level &amp; connections</li> <li>- Submit an oil sample for analysis</li> <li>- If "Spinner II" not in place / not functional</li> <li>- Continue normal operation</li> <li>- At 500 Operating Hours</li> <li>- Ensure they are clean / no leaks</li> <li>- Ensure original condition &amp; security</li> <li>- <a href="#">Refer to systems torques checked</a></li> </ul> |
|--|--|

#### EVERY 500 OPERATING HOURS

- |   |   |
|---|---|
| <ol style="list-style-type: none"> <li>19. ENGINE OIL &amp; FILTER CHANGE</li> <li>20. REPLACE FUEL FILTER ELEMENTS</li> <li>21. FAN HUB - WHEN GREASE FITTING EQUIPPED</li> <li>22. PUMP DRIVE HOUSING</li> <li>23. HYDRAULIC SYSTEM OIL SAMPLE</li> <li>C. <a href="#">TOP DRIVE ELEVATORS</a></li> </ol> | <ul style="list-style-type: none"> <li>- Reference 16C. / submit an oil sample</li> <li>- Pre-fill new elements with clean fuel only</li> <li>- Grease three shots only</li> <li>- Submit an oil sample</li> <li>- From both "open" &amp; "closed" loop circuits</li> <li>- <a href="#">Inside diameter, taper, pin wear</a></li> </ul> |
|---|---|

#### 1000 OPERATING HOURS

- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>24. SPINNER II OIL CLEANING CENTRIFUGE</li> <li>25. ENGINE COOLANT TEST</li> <li>26. PUMP DRIVE HOUSING &amp; FILTER</li> <li>27. HYDRAULIC TANK RETURN FILTER</li> <li>D. <a href="#">SWIVEL CRANKCASE SERVICE</a></li> <li>E. <a href="#">GEAR BOX QUILL BEARING</a></li> </ol> | <ul style="list-style-type: none"> <li>- Perform full service / examine filter cake</li> <li>- Maintain coolant integrity</li> <li>- Service complete system</li> <li>- Install only Schroeder elements</li> <li>- <a href="#">Drain and change the oil</a></li> <li>- <a href="#">Check the bearing preload</a></li> </ul> |
|--|---|

#### EVERY 4000 OPERATING HOURS

- |   |  |
|---|--|
| <ol style="list-style-type: none"> <li>28. HYDRAULIC CHARGE PUMP FILTER</li> <li>29. HYDRAULIC SYSTEM MANIFOLD FILTERS</li> </ol> | <ul style="list-style-type: none"> <li>- Install only Schroeder elements</li> <li>- Change regardless of monitor readings</li> </ul> |
|---|--|

#### EVERY 6 MONTHS REGARDLESS OF OPERATIONAL HOURS

- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>30. ENGINE AIR FILTER PRIMARY ELEMENTS</li> </ol> | <ul style="list-style-type: none"> <li>- Change air filter primary element</li> </ul> |
|--|---|

#### ONCE A YEAR

- |   |  |
|---|--|
| <ol style="list-style-type: none"> <li>31. ENGINE COOLING SYSTEM FILTER(S)</li> <li>32. ENGINE VALVES &amp; INJECTORS RESET</li> <li>33. ENGINE DIAGNOSTICS TEST</li> <li>34. ENGINE COOLANT QUALITY TEST</li> <li>35. ENGINE AIR CLEANER PRIMARY &amp; SECONDARY ELEMENTS</li> </ol> | <ul style="list-style-type: none"> <li>- Replace filter and/or "Need Release"</li> <li>- Done by authorized personnel only</li> <li>- Done by authorized personnel only</li> <li>- Send coolant sample for analysis</li> <li>- Must be replaced regardless of condition</li> </ul> |
|---|--|

THESE ARE MINIMUM REQUIREMENTS ONLY!



# ...And Explained in Detail.

## 26. PUMP DRIVE HOUSING & FILTER

### - Service complete system

- Drain oil from the bottom of the pump drive compound housing. The unit is not equipped with a specific drain port, but there is a hose mounted on the bottom of the compound housing that must be removed to drain the oil from the bottom most area of the housing.

- Drain the oil from the bottom of the "Donaldson" filter housing. There is a drain valve at the bottom of this housing.
  - Remove the cover off the top of the "Donaldson" filter housing and remove the filter element.
  - When the filter element is removed and the housing drained, install the new filter element and manually add oil to the top of the canister.



Remove the hose connection and drain the oil from here for 30 minutes

- Remove the drain valve plug...allow sufficient time for the housing to drain and the hoses to drain.
- In locations where the "Racor" or "Oberg" screen filter are mounted on the frame rail, dismantle it and clean the screen as well.



- To service this area first turn the valve off to ensure the flow through the screen has stopped. This can be done while the unit is operating fully and online. While the valve is in the shut off position, oil is still circulating through the by pass circuit.
- Remove the plug / magnetic probe / screen assembly and closely observe any materials that may be lodged in the screen and attached to the magnetic probe. Remember that this device is not only used to protect the entire hydraulic pump drive system but is also a great tool in determining the health of the unit and becomes an early warning system to alert you to responding to situations that are developing there. Respond in the appropriate manner.
- If the entire assembly is clean and no further action is required, reassemble the system and move the directional valve in-line with the assembly to again establish the oil flow to the "full open" position.
- Where the reservoir system is in place, drain and clean it thoroughly. Replace the lid seal and clamp it on tight.



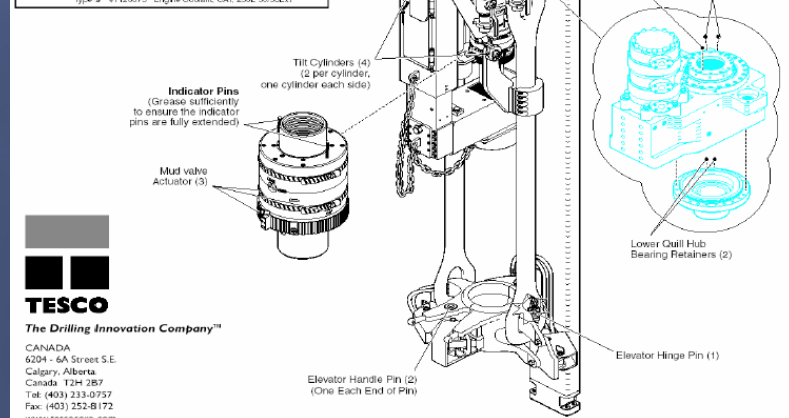
## TESCO MODEL HMI TOP DRIVE LUBRICATION SCHEDULE

Grease Lubrication Schedule				
Lubricate	Number of Points	Daily	Type	
Swivel Yoke grease nipples	4	•	•	1
Upper bearing retainer of swivel yoke grease ports	2	•	•	1
Lower bearing retainer of swivel yoke grease ports	2	•	•	1
Roller bearing	1	•	•	1
Link & rollers (if parallel)	4	•	•	1
Swivel grease ports	3	•	•	1
Mud valve actuator	2	•	•	1
Swivel link hinge point ports	6	•	•	1
Swivel roller bearing point ports	6	•	•	1
Swivel pin	1	•	•	1
Swivel upper bearing retainer	1	•	•	1
Swivel lower bearing retainer	1	•	•	1
Indicator pins	2	•	•	1

\*Note when high spin is encountered, grease must be applied more frequently such that the indicator registers full. Inspect frequently during high spin operations.

Lubrication Schedule		
Description	Frequency	Type
Swivel Oil Level	Daily	5
Swivel Oil Level	Daily	5
Pump Drive	Daily	4
Frame Motor Oil Level	Daily	6
Auxiliary System Oil Level	Daily	7
Close Loop Hyd. System	Daily	7
Frame Motor Coolant	Daily	8 (DD Engine)
Frame Motor Coolant	Daily	9 (CAT Engine)

Recommended Lubricants		
Lubricant	Type	Tesco P/N Description
Grease	Type 1	4 2645 Esso Unirex EP2
	Type 2	4751141 Tesco Synthetic Blend Grease NLGI #2
	Type 10	4751142 Tesco Synthetic Blend Grease NLGI #1
Gear Oil	Type 3	4751140 Tesco Multi-Grade Gear Oil 80W-90
	Type 4	4751135 Tesco Single Weight Motor Oil SAE40
	Type 5	4751135 Tesco Gear & Bearing Oil ISO 220
Engine Oil	Type 6	4751134 Tesco Synthetic Blend Motor Oil SAE15W-40
Hydraulic Oil	Type 7	4751143 Tesco Hydraulic Oil ISO 68
Coolant	Type 8	4120021 Engine Coolant, DD 50/50 Power Cool
	Type 9	4120075 Engine Coolant, CAT, 25% 50/50
	Type 9	4120075 Engine Coolant, CAT, 25% 50/50



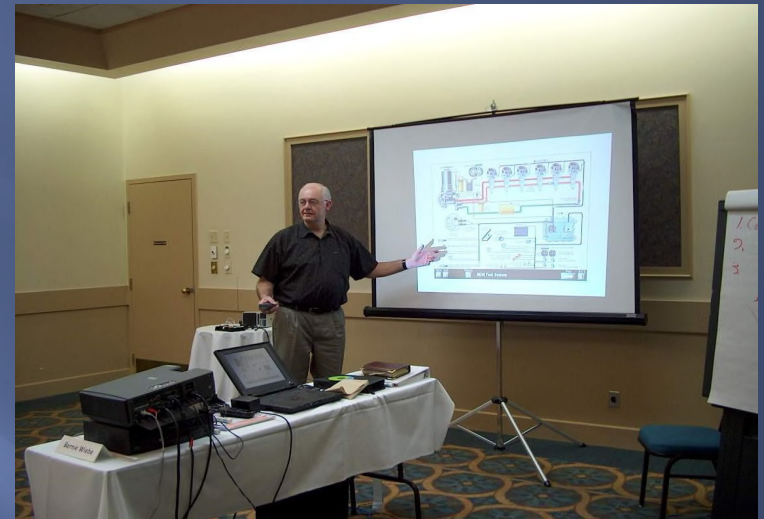
**TESCO**

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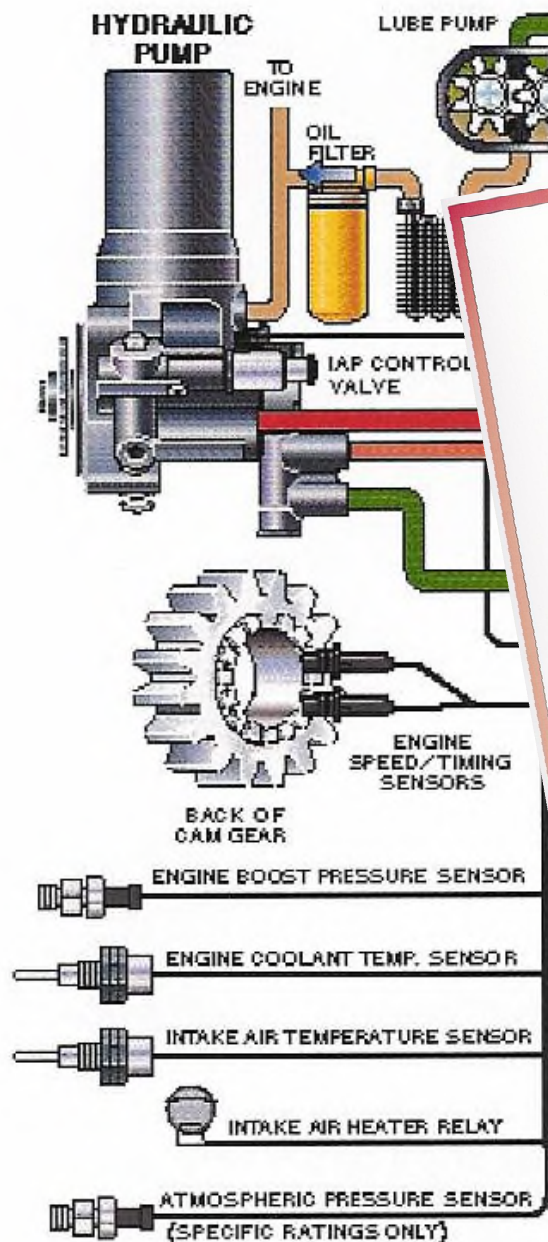
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# Preventive Maintenance Training

- ▣ Designed for the operator, field supervisor, purchasing, maintenance planner and all operations officers.
- ▣ Bring a basic level of component understanding.
- ▣ Basic knowledge will lead to a natural and well reasoned response.

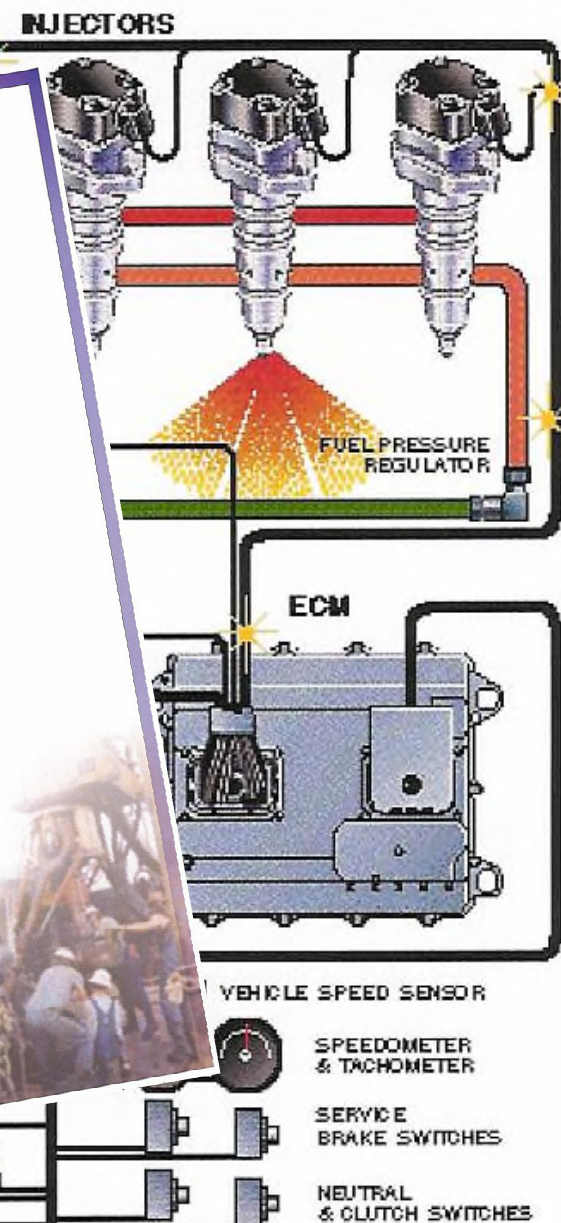
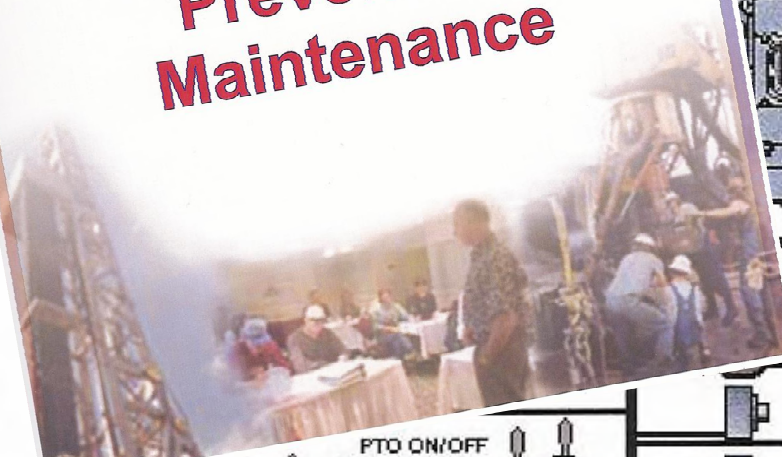




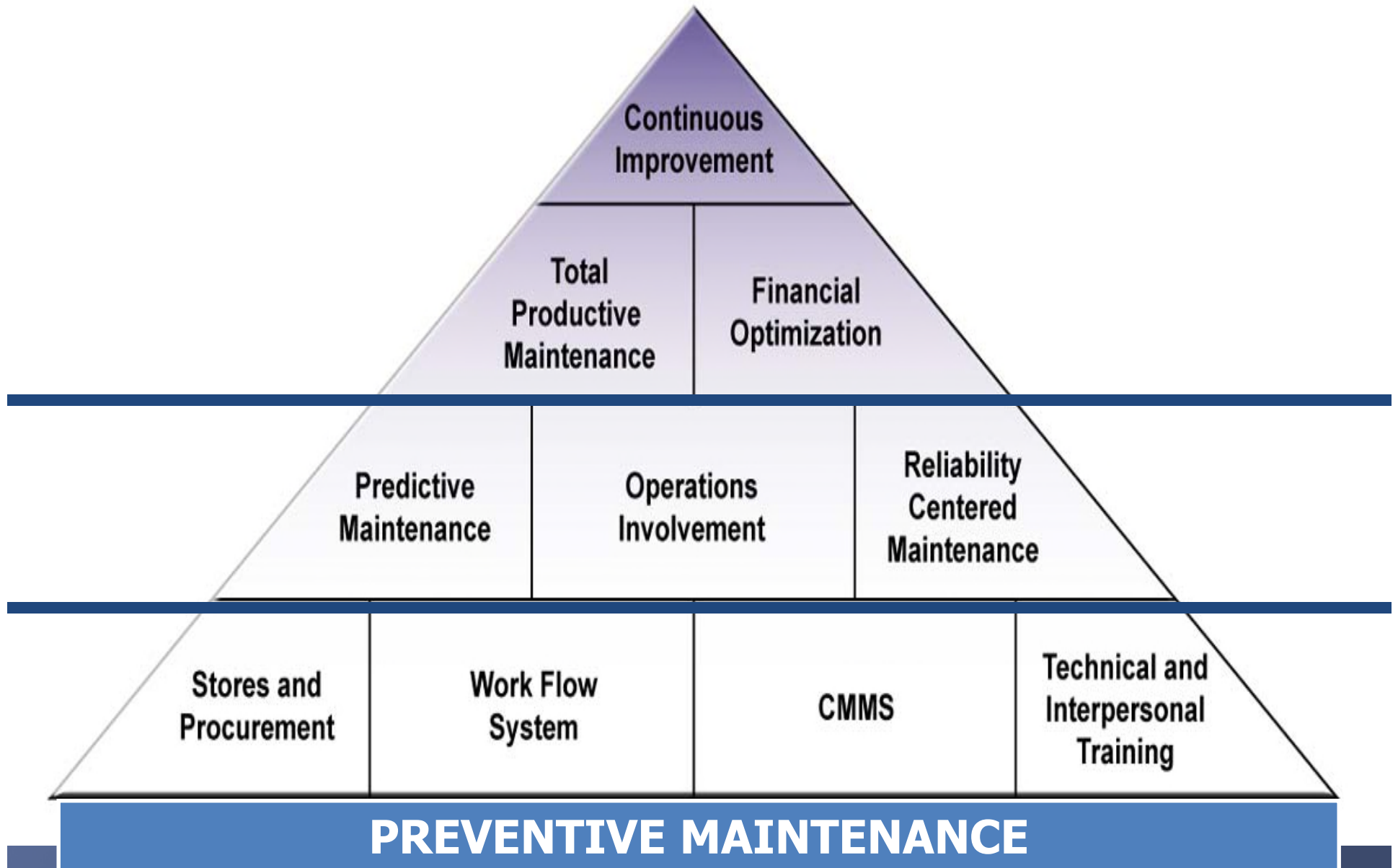


Alert Systems Ltd.

## Service Training in Preventive Maintenance



# Asset Management





The logo for Alert Systems Ltd. features a stylized, blue, curved graphic element resembling a swoosh or a stylized 'A' above the company name.

**Alert Systems Ltd.**

- ▣ We will work with your “information systems” department to make automation a reality.
- ▣ We will consider what you already have in place, your future growth plans, goals and the direction your company wants to move.
- ▣ Equipment tracking and inventory management
- ▣ Automated / Electronic preventive maintenance
- ▣ Verify and monitor that preventive maintenance is performed.

# Quality Asset Management Solutions

- ▣ Track equipment life cycle.
- ▣ Track equipment costs
- ▣ Perform comparative performance analysis.
- ▣ Integrate maintenance intervals and procedures with an automatic accountability format.





# **The “Alert” advantage:**

- ❑ **Alert Systems offers proactive asset specific PM research.**
- ❑ **Alert Systems compiles PM programs that equip operators to operate equipment with skill and maximum uptime.**
- ❑ **Alert Systems provides resource training to ensure that everyone who should know,...does know.**
- ❑ **Alert Systems works together with other “like minded” persons and companies that exceed OEM recommendations, in fact the goal is to far exceed the expectations of most OEM’s.**
- ❑ **Alert Systems believes that performance and profit are directly linked to the personnel and asset base of the client. Each will excel or fall depending on how they are managed.**
- ❑ **Good PM doesn’t cost a dime,...it generates revenue you never had before,...and with much less effort!!**

# Important elements for consideration

- ▣ 1. Downtime: The most feared enemy of every contractor. What does it cost you?
- ▣ 2. Unskilled workers: Alert Systems Ltd. has already trained over 25,000 rig personnel worldwide on good preventive maintenance practices. What do they cost you?
- ▣ 3. Disorganized operations personnel,...they are always busy, but at what?



# 1. Downtime

The rig is only as reliable as its weakest component or person. **Downtime costs big money in:**

- ▣ The element of surprise and people's reaction to the failure,...
- ▣ Immediate loss of production - there is no negotiation - it's over!...
- ▣ Scheduling and repairing, gaining control of shut-down time,...

# Downtime continued,...

- ▣ Parts, hotshots, communications, and inconvenience to field operations
- ▣ Embarrassment of downtime costs that may reflect on the reputation of the contractor
- ▣ Tarnished reputation that may affect future contract possibilities
- ▣ Question?: What does downtime cost you? Each 1% equals how many \$'s in lost revenue?
- ▣ Question?: What % of your total revenue is turned right back into repair and maintenance?



## 2. Training unskilled workers:

- ▣ Learn the basics, make the right choices, react to situations wisely, and the results will follow naturally.
- ▣ “Bernie, I just need you to know that I really appreciate the time you took to make sure we understood every point before you went on to the next. I love your stories and they will help me remember the main points long after we leave here.” Rig Manager
- ▣ “It's too bad but I believe that one of the biggest revenue generators is ignorance.”

Barry Beierbach - North American Business Unit Top Drive Division -  
Tesco Corporation

### 3. Operations personnel

- ▣ Disorganized operations personnel,...they are always busy, but at what?
- ▣ Sadly, operations personnel are typically upgraded into a management position but they are not given an attainable vision or expectation. They are told to “keep it running and do whatever you need to do to avoid downtime”. That’s it,...a very unreasonable expectation.
- ▣ “The oil industry is so rich with cash that they don’t need to be good managers,...they make money in spite of their poor operations habits.”



# The Preventive Maintenance Solution

- ▣ 1. A maintenance audit. This includes rig visits as well as a review of past history R&M.
- ▣ 2. A review and customized “goals oriented” plan to include proven PM practices, purchases, procedures.
- ▣ 3. Compile a PM Program that lists the “expectations” at every rig.
- ▣ 4. Training of all operations personnel along with all field personnel at every level.
- ▣ 5. All of the above will generate some changes / upgrades at the rig as well as in procurement.

## PM Solution continued,...

- ▣ 6. Switching or upgrading from a manual tracking system to an electronic version. Daily maintenance tracking of time and \$'s.
- ▣ 7. Monitoring / auditing outside services / OEM's procedures as to their practices and performance.
- ▣ 8. This procedure will become so much a part of this company that a new culture is formed. No longer should we be satisfied with "failures" but we should expect incredible service from both our rigs and our people. Not working hard, but smarter for longer.



# **What can you expect! If you have not had a PM Program in place in the past, expect,...**

- ▣ 1. To cut your downtime in half in one year. Included in this is to drop R&M to within 5-7% of revenue.
- ▣ 2. To increase the life expectancy of all rotating equipment from 400% – 600% in 3 years over today's standards.
- ▣ 3. To increase the life of many of the consumables by 200%-1000% in 3 years.
- ▣ 4. To drastically reduce the need for company mechanics, or outside services for mechanical help.

# Expect!...

- ▣ 5. Drastic reduction in inventory and spare parts on hand. This begins as soon as the labor force is trained.
- ▣ 6. Employee satisfaction levels will rise, so less pressure on the HR department. Quite naturally this will lead to a substantially upgraded work force.
- ▣ 7. To exceed the typical OEM's equipment life cycle expectations. You will surprise them and yourself.
- ▣ 8. In the present market (2015), the only costs you can control on working rigs is maintenance
- ▣ **What do you have in place to do this successfully?**
- ▣ See more about Alert Systems Ltd. at [www.alertsystems.net](http://www.alertsystems.net)



## A direct quote

- ▣ “In these six months we have increased our efficiency levels to reflect the income of 25 rigs where we have 24. In other words, the procedures that you have showed us gave us the extra revenue of one rig. The rig did not need to be built, moved, outfitted or staffed... the money is just there. And, the numbers take into consideration the capital costs needed to implement your suggestions.”  
- Drilling Rig Senior Vice President

Consider the definition!!

▣ **ALERT ....**

- ▣ “to warn or arouse to a sense of danger or call to a state of preparedness.”
- ▣ “to warn or arouse to a sense of profitability in an environment of instability.”